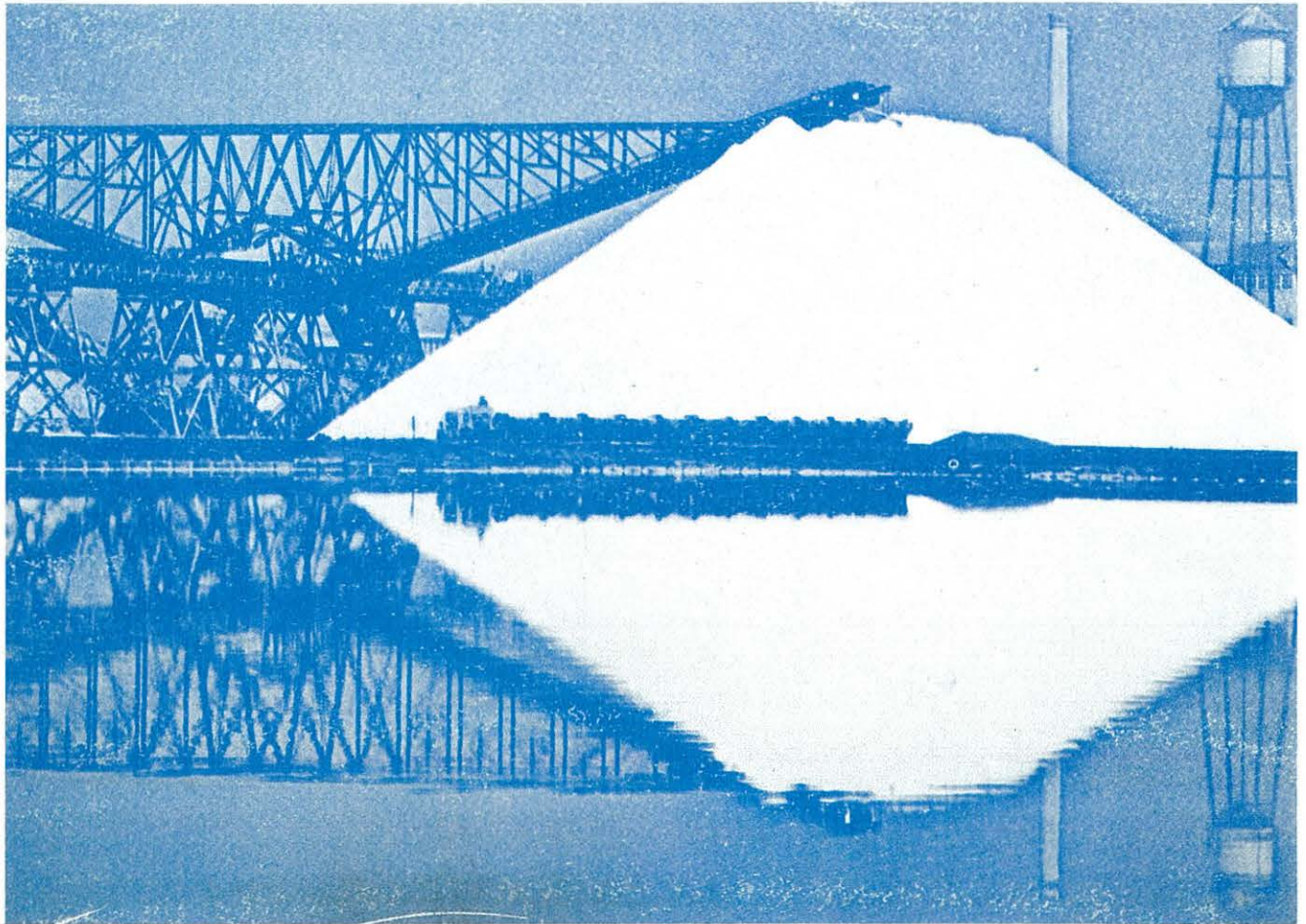


LESLIE SALT COMPANY



REPORT ON PROPOSED DISCHARGE OF BITTERN TO SAN FRANCISCO BAY

March 31, 1972

CALIFORNIA REGIONAL WATER

APR 13 1972

QUALITY CONTROL BOARD



CDM

Inc.

ENVIRONMENTAL ENGINEERS

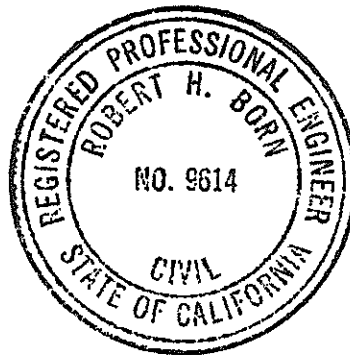
283 SOUTH LAKE AVENUE

PASADENA, CALIFORNIA 91101

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REPORT ON PROPOSED DISCHARGE
OF BITTERN TO SAN FRANCISCO BAY

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CDM

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	SERVICES DURING CONSTRUCTION

283 SOUTH LAKE AVENUE

PASADENA, CALIFORNIA 91101

TELEPHONE: (213) 684-2126

March 31, 1972

Mr. Guy Wilkins
Leslie Salt Company
7220 Central Avenue
Newark, California 94560

Dear Mr. Wilkins:

We are pleased to transmit herewith our report entitled
"Proposed Discharge of Bittern to San Francisco Bay,"
dated March 31, 1972.

The report describes a project for the proposed discharge of bittern from the Baumberg, Redwood City and Newark salt production plants of the Leslie Salt Company through a diffuser to be located near Dumbarton Bridge, and evaluates the probable environmental impact of the discharge on the receiving waters of San Francisco Bay. Particular emphasis is given to a definition of the physical configuration of the plume and the probable toxic effects on the striped bass fishery and benthic organisms.

The report concludes that the proposed discharge would have no significant adverse effect on the marine environment and that it could be accomplished without violation of existing Federal and State laws and regulations.

The report recommends that the Leslie Salt Company make application for a construction and waste discharge permit from the U.S. Army Corps of Engineers, and for waste discharge standards from the California Regional Water Quality Control Board, using the report as documentation in each instance to demonstrate that the proposed discharge would be in conformity with existing laws and regulations.



Mr. Guy Wilkins - page 2
March 31, 1972

We appreciate the opportunity to have been of assistance to the Leslie Salt Company in this engagement. We are also appreciative of the generous advice and assistance you and members of your staff, Mr. Robert Focht and Mr. C. R. Barner, have rendered during the course of our investigation.

Very sincerely,

CDM Inc., ENVIRONMENTAL ENGINEERS

A handwritten signature in blue ink, appearing to read "Robert H. Born".

Robert H. Born
Executive Vice President

RHB:da

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ACKNOWLEDGEMENT

CDM Inc., ENVIRONMENTAL ENGINEERS, expresses its sincere appreciation to Mr. Guy Wilkins, Mr. C. R. Barner and Mr. Robert Focht of the Leslie Salt Company for their invaluable assistance and advice throughout the entire investigation.

Appreciation is also expressed to Mr. Robert Scholar and Mr. David Armstrong of the California Regional Water Quality Control Board, San Francisco Bay Region, and to Mr. John Ladd and Mr. Mike Rugg of the California Department of Fish and Game for their helpful comments and advice.

REPORT ON PROPOSED DISCHARGE
OF BITTERN TO SAN FRANCISCO BAY

I. INTRODUCTION

As a by-product of the final stages of crude salt production, the Leslie Salt Company produces a liquor, or highly concentrated brine solution, termed bittern, which, until recently, had significant commercial value as a source of magnesium, bromine and gypsum salts. The recent loss of much of the historical market for its bittern, together with changes in Federal and State laws and regulations governing the discharge of bittern to San Francisco Bay, have caused Leslie Salt Company to investigate various alternative means of bittern disposal.

In December 1970, CDM Inc., ENVIRONMENTAL ENGINEERS was engaged to investigate specific means whereby bittern might be discharged directly to San Francisco Bay without causing harm to the biota of the Bay or otherwise violating applicable laws and regulations, and to prepare a comprehensive report thereon which could be used in support of subsequent applications by Leslie Salt Company for waste discharge permits from the Federal and State Governments.

History of Leslie Salt Company

The Leslie Salt Company is a consolidation of numerous salt production and refining enterprises, some of which were organized more than a century ago. Through the process of consolidation and regrouping, the companies were reduced in number over the years, plants were dismantled or were relocated and modernized, until by 1941, the Leslie Salt Company remained as the major crude salt production enterprise in the San Francisco Bay area.

Early Salt Industry History

The salt industry in California had its origin in 1856 when the first quantity of natural salt was placed on the San Francisco market. The industry grew rapidly thereafter, particularly during development of the Comstock Lode when crude salt was utilized in the refining of silver, and during World War II when the demand for crude salt and other chemical derivatives of seawater was high.

Salt production increased from about 17,000 tons in 1868 to nearly 100,000 tons per year by the turn of the century. Operations during this period were characterized by the creation of numerous production and refining enterprises, each with production capacities ranging from 200 to 20,000 tons per year.

Additional mergers and reorganizations occurred in the early 1900's in an effort to overcome the chronic overproduction of the period. From approximately ten enterprises at the turn of the century, the total number of producers was reduced to six by 1927. The final merger of crude salt producers took place in 1936 when the Arden Salt Company was merged with the Leslie California Salt Company.

Growth of Leslie Salt Company

The growth in crude salt production has been spectacular since 1907, when the Leslie Salt Refining Company was organized as the first company to bear the Leslie name. By 1936, when the present Leslie Salt Company was incorporated, between 300,000 and 325,000 tons of salt were produced each year from about 12,000 acres of ponds by two companies operating five plants. At the conclusion of World War II, the production had grown to nearly 500,000 tons per year. At present, Leslie Salt Company produces salt from approximately 44,000 acres of salt ponds and appurtenant lands in the Bay area with a total annual capacity of 1,250,000 tons by the process of solar evaporation. Except for more efficient methods of handling and transportation of the crude salt, this ancient process is still being utilized today.

Present Salt Production Operations

Leslie presently operates four crude salt plants, the locations of three of which are shown on Figure 1. Each of the four plants is complete in itself and contains its own concentrating ponds, crystallizing ponds, harvesting equipment and a washer. Each of the plants can be operated as an independent unit although pipelines have been installed between the Baumberg and the Newark Plants as well as between the Redwood City and Newark Plants to facilitate the transfer of brine between plants for increased efficiency of pond utilization.

The salt production process is relatively simple yet time-consuming, in that five years are required to reduce the bay water to salt crystals. The bay water is pumped through a series of evaporation or concentrating ponds in stages over a four-year period during which the sun and wind evaporate the water and leave a highly concentrated brine solution. During the last year, the brine is pumped into crystallizer ponds where the final concentration, again solely through evaporation, takes place. At the conclusion of the season, the liquid material remaining, termed bittern, is pumped or drained away to special storage ponds leaving about a 4-inch layer of sodium chloride crystals.